

Oct. 20, 1955.

Dr. J. Lederberg

Dear Joshua,

I was unable to find the exact address of the company selling the moving coil earphones but if you have a Chicago 'phone book it should be easy. The name is; R.W. Electronics and their location is on South Michigan Avenue, in the region of ~~25th~~ 2500 block.

I am sending you under separate cover one of the phones. It can be safely opened by prying up the aluminum cover plate all around the rim and then lifting the cover off. It is not attached to anything inside so do not fear that the cone will be injured. Then you will find inside a miniature loudspeaker attached only by its two voice current wires.

I haven't got around to experimenting with the unit myself. It looks capable of good motion of more than  $\sqrt{0.1}$  mm but well under 1.0mm, probably max. 0.3. the range can be fully used in a circuit where the current changes sign, thus doubling the maximum D.C. deflection. I would guess that care should be taken to restrict the wattage dissipated in the speaker to something under 1/2 watt. ~~1/2 watt~~ Please note that the unit contains an output transformer! This must be removed for D.C. work as it will (I estimate) not work below a few hundred cycles. Measure the D.C. resistance of the voice coil and restrict the current so that  $I^2R$  is less than 1/2 watt.

One additional remark. If you want to try putting a coaxial shaft through the thing, you will have to drill through the alnico magnet. This cannot be done with the average twist drill but can be done with some high speed bits. But the risk is very large, in doing so, that a metal chip will fall into the gap and foul up the voice coil movement unless special precautions are taken.

I am also sending you a copy of a ~~paper~~ report I wrote on an ONR project last year and have just received copies of. It is written somewhat generally in general terms but I had in mind part of a model for evolutionary systems. The basic model described ~~the~~ could represent to some extent the behavior of a population of a species in a selecting environment under the influence of frequent and small (?) mutations. The model is not specifically adapted for this purpose, but rather as a general aid for developing certain search processes with which I was concerned at that time. The last part of the paper contains a proof that for every mechanism with finite capacities there are search problems that it can solve only if it is equipped with some source of random behavior!

Sincerely,

*M. L. Minsky*

M.L. Minsky  
112 Newbury Street  
Boston 16, Mass.